

***** ABSTRACT ONLY *****

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ABSTRACT
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Sidewall Sprinkler System Design Alternatives for the Rooms in the Library of Congress

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As part of a renovation project in the Library of Congress, automatic sprinklers systems were being installed in selected areas. In some cases, requirements for the installation of these systems following NFPA prescriptive standards conflicted with the desire to maintain the aesthetics of the decorative room interiors. To minimize the impact of the sprinkler system installation while maintaining performance, some unconventional system designs were analyzed using engineering methods. The relative sprinkler system performance between design alternatives was based solely on predictions of response time. For the proposed alternative sidewall sprinkler systems, sprinkler RTI and position below the 5.8 m high ceiling in a 14.3 m x 8.5 m reading room were varied in the calculations to achieve equivalent response time to systems satisfying the requirements of the NFPA installation standard. Results of the analysis using DETACT showed that a system installed using fast response, $RTI = 28 \text{ m}^{1/2}\text{s}^{1/2}$ sidewall sprinklers installed 0.81 m below the ceiling would respond just as fast as a system using $RTI = 110 \text{ m}^{1/2}\text{s}^{1/2}$ sidewall sprinklers installed 0.20 m below the ceiling. Installations were made in the library following the alternate approach. Results of the previous engineering analysis are reviewed based on performance predictions from state-of-the-art fire models employing large eddy simulation techniques.

*Suggested for sessions on Fire Safety Design for Historically Significant Structures